

NEDERLANDS ELEKTROTECHNISCH
COMITE
POSTBOX 5059
2600 GB DELFT

This specification is also available from
Nederlandse Philips Bedrijven B.V.

CECC 90 104-075



ISSUE 2

Page 1

Total number of pages: 14

**ELECTRONIC COMPONENTS OF ASSESSED
QUALITY IN ACCORDANCE WITH:**

GS: CECC 90 000 Issue 3.
SS: CECC 90 100 Issue 3.
FS: CECC 90 104 Issue 2.

Detail Spec: NL-CECC 90 104-075

Issue: 2

Issued: December 1989

OUTLINE AND DIMENSIONS:

IEC 191-2 | 050 G09/A76 G1

TERMINAL CONNECTIONS:

See item 1.3 of this specification

**DETAIL SPECIFICATION FOR
DIGITAL INTEGRATED CIRCUITS
IN ACCORDANCE WITH FS 90 104**

HEC/HEF4522B

Programmable 4-bit BCD down counter

TYPICAL CONSTRUCTION:

Silicon monolithic local oxidation
CMOS integrated circuit, cavity/non-
cavity packages.

CAUTION: STATIC SENSITIVE DEVICE

ASSESSMENT LEVELS: P, Y, L

REMARKS

Information about manufacturers who have components qualified to this detail specification is
available in the current CECC 00 200: Qualified Products List.



Documents

Document Sharing Hub

Nederlands Elektrotechnisch Comité Postbox 5059 2600 GB Delft	Page 2	CECC 90 104-075
This specification is also available from Nederlandse Philips Bedrijven B.V.	of 14	ISSUE 2

1 TYPE DESCRIPTION

1.1 Function

The HEC/HEF4522B are synchronous programmable 4-bit BCD down counters, each with an active HIGH and an active LOW clock input (CP_0 , $\overline{CP}_1$), an asynchronous parallel load input (PL), four parallel inputs (P_0 to P_3), a cascade feedback input (CF), four buffered parallel outputs (O_0 to O_3), a terminal count output (TC) and an overriding asynchronous master reset input (MR).

These devices are programmable, cascadable down counters with a decoded TC output for divide-by-n applications. In single stage applications the TC output is connected to PL. CF allows cascade divide-by-n operation with no additional gates required.

Information on P_0 to P_3 is loaded into the counter while PL is HIGH, independent of all other input conditions except MR, which must be LOW. When PL and $\overline{CP}_1$ are LOW, the counter advances on a LOW to HIGH transition of CP_0 . When PL is LOW and CP_0 is HIGH, the counter advances on a HIGH to LOW transition of $\overline{CP}_1$. TC is HIGH when the counter is in the zero state ($O_0 = O_1 = O_2 = O_3 = \text{LOW}$) and CF is HIGH and PL is LOW. A HIGH on MR resets the counter (O_0 to $O_3 = \text{LOW}$) independent of other input conditions.

Schmitt-trigger action in the clock input makes the circuit highly tolerant to slower clock rise and fall times.

1.1.1 Function table

MR	PL	CP_0	$\overline{CP}_1$	mode
H	X	X	X	reset (asynchronous)
L	H	X	X	preset (asynchronous)
L	L	/	H	no change
L	L	L	\	no change
L	L	\	X	no change
L	L	X	/	no change
L	L	/	L	counter advances
L	L	H	\	counter advances

H = HIGH state (the more positive voltage)

L = LOW state (the less positive voltage)

X = state is immaterial

/ = positive-going transition

\ = negative-going transition

Nederlands Elektrotechnisch Comité Postbox 5059 2600 GB Delft	Page 3	CECC 90 104-075
This specification is also available from Nederlandse Philips Bedrijven B.V.	of 14	ISSUE 2

1.1.2 Counting mode

CF = HIGH; PL = LOW; MR = LOW

count	outputs			
	O ₃	O ₂	O ₁	O ₀
9	H	L	L	H
8	H	L	L	L
7	L	H	H	H
6	L	H	H	L
5	L	H	L	H
4	L	H	L	L
3	L	L	H	H
2	L	L	H	L
1	L	L	L	H
0	L	L	L	L

1.1.3 Single stage operation

Divide-by-n; MR = LOW; CF = HIGH; $\overline{CP}_1$ = LOW

PL	P ₃	P ₂	P ₁	P ₀	divide by	TC output pulse width
L	X	X	X	X	10	one clock period
TC	H	H	H	H	15	clock pulse HIGH
TC	H	H	H	L	14	
TC	H	H	L	H	13	
TC	H	H	L	L	12	
TC	H	L	H	H	11	
TC	H	L	H	L	10	
TC	H	L	L	H	9	
TC	H	L	L	L	8	
TC	L	H	H	H	7	
TC	L	H	H	L	6	
TC	L	H	L	H	5	
TC	L	H	L	L	4	
TC	L	L	H	H	3	
TC	L	L	H	L	2	
TC	L	L	L	H	1	
TC	L	L	L	L	no operation	

Nederlands Elektrotechnisch Comité Postbox 5059 2600 GB Delft This specification is also available from Nederlandse Philips Bedrijven B.V.	Page 4 of 14	CECC 90 104-075 ISSUE 2
--	---------------------	--------------------------------

1.1.4 State diagram

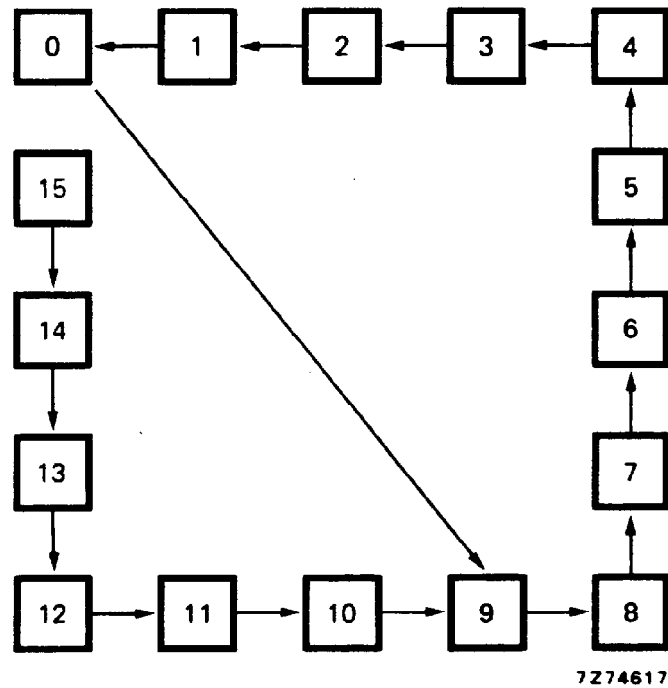


Fig. 1 State diagram.

Nederlands Elektrotechnisch Comité Postbox 5059 2600 GB Delft This specification is also available from Nederlandse Philips Bedrijven B.V.	Page 5 of 14	CECC 90 104-075 ISSUE 2
--	-------------------------	------------------------------------

1.1.5 Functional diagram

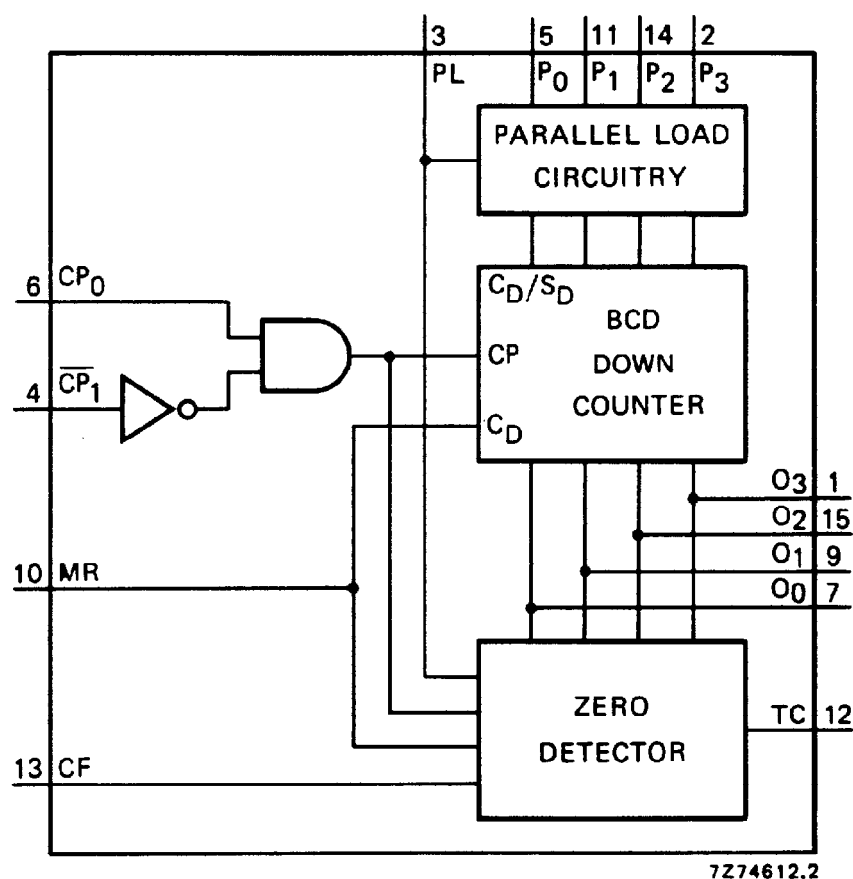


Fig. 2 Functional diagram.

1.1.6 Pinning information

PL	parallel load input
P ₀ to P ₃	parallel inputs
CF	cascade feedback input
CP ₀	clock input (LOW to HIGH, triggered)
$\overline{CP}_1$	clock input (HIGH to LOW, triggered)
MR	asynchronous master reset input
TC	terminal count output
O ₀ to O ₃	buffered parallel outputs